KEYBOARD INSTRUMENT SUPPORT WITH ADJUSTABLE ABIILITY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a keyboard support, and more particularly to the keyboard support which is able to adjust the height of the keyboard instrument to meet various users' needs.

2. Description of Related Art

With reference to Fig. 7, it is noted that a conventional keyboard instrument support is shown and has a pair of bases (72) engaging with the ground, a pair of outer tubes (70) respectively obliquely extending out from a distal end of the bases (72), a pair of inner tubes (701) respectively and movably received in a corresponding one of the outer tubes (70) and a pair of supporting beams (71) respectively and pivotally connected to a free end of the inner tubes (701). A first securing element (703) is provided on a side face of each outer tube (70) and has a bolt extending through the side face of the outer tube (70) to abut an outer face of the inner tube (701) by a distal free end of the bolt so that the movable movement of the inner tube (701) relative to the outer tube (70) is limited. A second securing element (731) is provided on a connection beam (73) sandwiched between the two outer tubes (70) to connect the two outer tubes (70) together. The second securing element (731) has a bolt extending through an outer face of the connection beam (73) and abut an outer face of a second inner tube slidably received inside the connection beam (73) such that the distance between the two outer tubes (70) is adjustable by screwing the second securing element (731).

When the support as shown is in application, it is noted that the securing force between the inner tubes and outer tubes (70) is based on the friction between the distal

end of the bolt and the outer faces of the inner tubes. Therefore, after the keyboard instrument is placed on top of the supports (71), the weight of the keyboard instrument may overcome the frictional engagement between the bolts and the inner tubes, whereby the support may collapse from its telescoped height such that in the least the keyboard will crash to the floor, and the player may even be injured.

Furthermore, when the operator is trying to adjust the inner tubes (701), the operator has to maintain the length of the two inner tubes (701) to be the same. Otherwise, if the support provides an inclined surface, after the keyboard instrument is placed on top of the keyboard instrument support, the keyboard instrument may slide off the support. That is, the two supports (71) have to be carefully maintained horizontally at all times when the conventional keyboard instrument is placed on top of the keyboard instrument support, which is very troublesome and labor inefficient.

To overcome the shortcomings, the present invention tends to provide an improved keyboard instrument support to mitigate the aforementioned problems.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide an improved keyboard instrument support to provide easy adjustable function to ensure that the support is able to horizontally keep the keyboard instrument at a safe, suitable and consistent height.

Another objective of the present invention is to provide a ratchet device such that when the support and keyboard instrument are being raised, the ratchet device is able to support the keyboard instrument and when the keyboard instrument is being lowered, the ratchet in the ratchet device is not driven to allow a smooth descending of the keyboard instrument.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the support of the present invention;

Fig. 2 is an exploded perspective view showing the ratchet device in combination with a supporting beam;

Fig. 3 is a schematic cross sectional view showing the application of the ratchet device in the supporting beam;

Fig. 4 is a schematic cross sectional view showing the engagement of the first cup in the connector and the second cup in the ratchet due to the rotation of the handle in a first direction;

Fig. 4A is a schematic cross sectional view showing the relative relationship between the connector and the threaded bolt of the second rotation tube in the first direction;

Fig. 5 is a schematic cross sectional view showing the disengagement of the first cup and the second cup due to the rotation of the handle in a second direction opposite to the first direction;

Fig. 5A is a schematic cross sectional view showing the relative relationship between the connector and the threaded bolt of the second rotation tube in the second direction;

Fig. 6 is a perspective view showing the application of the keyboard instrument support with a keyboard instrument supported thereupon; and

Fig. 7 is a perspective view showing a conventional keyboard instrument

support.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to Fig. 1, the keyboard instrument support in accordance with the present invention includes a Z-shaped bracket (10) composed of two legs (11) horizontally separated from each other, two outer tubes (13) respectively and obliquely extending out from distal ends of the two legs (11), two inner tubes (14) slidably received in the two outer tubes (13) respectively and two arms (12) horizontally separated from each other and extending from free ends of the two inner tubes (14).

Two connecting tubes (20) with two sliding tubes (22) each slidably received in a corresponding one of the two connecting tubes (20) are securely connected to outer faces of one of the outer tubes (13) and one of the inner tubes (14). In this embodiment, two distal ends of the two connecting tubes (20) are connected to the outer faces of the outer tube (13) and the inner tube (14) in the same side of the support of the present invention. Distal ends of the two sliding tubes (22) are securely connected to outer faces of one of the outer tubes (13) and one of the inner tubes (14). In this embodiment, two distal ends of the two sliding tubes (22) are connected to the outer faces of the outer tube (13) and the inner tube (14) in the same side of the support of the present invention opposite to the connecting tubes (20). Each of the connecting tubes (20) is provided with pivotal plate (201) with an eccentric block (202) integrally formed with the pivotal plate (201). The eccentric block (202) is selectively extendable through a through hole (200) in the outer face of the connecting tube (20) to engage the outer face of the sliding tube (22) so as to limit the sliding movement of the sliding tubes (22) inside the connecting tubes (20).

Furthermore, each of the two outer tubes (13) is provided with a seat (40,302),

namely the first seat (40) on the left side in Fig. 1 and the second seat (302) on the right side in Fig. 1, composed of two plates and integrally formed with the outer face of each of the two outer tubes (13), a first rotation tube (301) having a closed end securely formed with the second seat (302) and an open end to slidably receive therein a second rotation tube (31) having a free end extending out of the first rotation tube (301) and securely connected to an outer face of the first seat (40).

With reference to Fig. 2, the second rotation tube (31) is provided at the free end thereof an extension (32), a threaded bolt (33) integrally formed with the free end of the extension (32) and a through hole (34) radially defined through the threaded bolt (33). A hole (130) is defined in the outer face of each of the two outer tubes (13), and the first seat (40) and second seat (302) are respectively mounted on a periphery defining the hole (130) such that the two plates of the first and second seats (40,302) are respectively on opposite sides of the hole (130) in each of the two outer tubes (13). The first seat (40) has a passage (401) defined through the two plates to allow an extension of the threaded bolt (33), and a connection seat (402) formed on an outer face of one of the two plates.

A ratchet device (50) is provided to the keyboard instrument support of the present invention to secure movement of the inner tubes (14) relative to the outer tubes (13). The ratchet device includes a roller (51), a leverage (52) and a ratchet (53). The roller (51) has an aperture (511) defined through the roller (51) to align with the passage (401) of the first seat (40) and multiple bosses (512) formed on an outer periphery of the roller (51). The leverage (52) defines a path (520) defined through the leverage (52) to receive the connection seat (402) of the first seat (40), a projection (521) formed on a top face of the leverage (52) and a finger (523) extending from a bottom face of the leverage (52). A screw (not numbered) is able to extend through the path (520) of the leverage (52)

and into the connection seat (402) of the first seat (40) to secure the engagement of the leverage (52) to the first seat (40) yet still allow the leverage (52) to be pivotable relative to the first seat (40).. A spring (54) has a first end securely connected to the outer face of the first seat (40) and a second end abutted to the finger (*522) of the leverage (52). The ratchet (53) has multiple ratchet teeth (531) formed on an outer periphery of the ratchet (53), a pathway (532) centrally defined through the ratchet (53) to align with the passage (401) and the aperture (511) of the roller (51) such that the threaded bolt (33) of the second rotation tube (31) is able to extend through the passage (401), the aperture (511) of the roller (51) and the ratchet (53) and a first cup (533) formed on an outer face of the ratchet (53). Preferably, a washer (not numbered) is sandwiched between the outer face of the first seat (40) and the ratchet (53) to smoothen the rotation of the ratchet (53) relative to the first seat (40). A handle (60) is provided to a side of the first seat (40) and rigidly connected to a connector (61) sandwiched between the handle (60) and the ratchet (53).

The connector (61) has, with reference to Fig. 4, a securing hole (62) defined through the connector (61) to align with the through hole (34) of the threaded bolt (33) of the second rotation tube (31) and allow an extension of a securing pin (65) extending through the aligned through hole (34) and the securing hole (62), a threaded bore (63) defined in the connector (61) to correspond to the threaded bolt (33) of the second rotation tube (31) and a second cup (64) formed on an inner face of the threaded bore (63) to correspond to the first cup (533) of the ratchet (53). It is to be noted that the dimension of the securing hole (62) is larger than the dimension of the securing pin (65) such that after the securing pin (65) is extended into the aligned through hole (34) and the securing hole (62), the securing pin (65) is free of engagement with an inner periphery

defining the securing hole (62).

With reference to Fig. 3 and Fig. 4, after the present invention is assembled, it is noted that the threaded bolt (33) of the second rotation tube (31) is extended through the first seat (40), the aperture (511) of the roller (51), the washer, the pathway (532) of the ratchet (53) and into the threaded bore (63) of the connector (61) which is securely and rigidly connected to the handle (60). After the roller (51) is received in the first seat (40), the bosses (512) extend into the hole (130) of the outer tube (13), wherein the projection (521) of the leverage (52) abuts a ratchet tooth (531) of the ratchet (53) and the finger (522) is securely abutted by the free end of the spring (54). Due to the abutment of the spring (54) to the finger (522), the projection (521) of the leverage (52) is so configured that the ratchet (53) can rotate in one direction only.

Meanwhile, the bosses (512) of the roller (51) extend through the hole (130) of the outer tube (13) and into one of multiple adjusting holes (141) defined through an outer periphery of the inner tube (14). Then a fixing element such as a limiting pin (132) is able to extend through the adjusting hole (141) of the inner tube (14) to limit movement of the inner tube (14) with respect to the outer tube (13).

With reference to Figs. 4, 4A, 5 and 5A, when the handle (60) is rotated in a first direction (to the right as shown in Fig. 4A by the arrow), because the handle (60) is firmly connected to the connector (61), the rotation of the handle (60) drives the connector (61) to rotate in the same direction as that of the handle (60). Further, because of the threaded connection between the connector (61) and the threaded bolt (33) of the second rotation tube (31), the rotation of the connector (61) also drives the second rotation tube (31) to rotate in the same direction as that of the second rotation tube (31). However, before the threaded connection between the connector (61) and the threaded

bolt (33) is completed, a margin is left in both the threaded bore (63) and the threaded bolt (33) such that the rotation of the connector (61) is not able to drive the second rotation tube (31) to rotate directly. Therefore, initially, when the handle (60) is started to rotate, the second rotation tube (31) is not rotated, but the threaded bolt (33) is moved deeper into the connector (61) due to the threaded connection between the threaded bolt (33) and the threaded bore (63), which tightens the connection between the threaded bolt (33) and the connector (61) and allows the securing pin (65) to abut a periphery defining the securing hole (62). In the meantime, the first cup (533) of the ratchet (53) abuts the second cup (64) of the connector (61) to create a friction therebetween. Thereafter, the rotation of the handle (60) drives the second rotation tube (31) to rotate simultaneously.

Because of the friction between the first and second cups (533,64) and the firmly connection between the roller (51) and the extension (32) of the second rotation tube (31), the rotation of the handle (60) drives the roller (51) to rotate in the same direction as that of the handle (60). Therefore, when the roller (51) is rotated, the bosses (512) inserted into the adjusting holes (141) of the inner tube (14) lift the inner tube (14) relative to the outer tube (13). Furthermore, the abutment of the projection (521) to the ratchet teeth (531) ensures that the height of the inner tube (14) relative to the outer tube (13) is retained after the inner tube (13) is lifted.

When the handle (60) is rotated in a second direction opposite to the first direction, to the left side as show by the arrow in Figs. 5 and 5A, initially, the rotation of the handle (60) releases the abutment of the securing pin (65) to the periphery defining the securing hole (62) and the engagement between the first and second cups (533,64). Thus the ratchet (53) will not be driven by the rotation of the connector (61) and a gap (70) is defined between the threaded bolt (33) and the threaded bore (63). However,

when the securing pin (65) abuts the periphery defining the securing hole (62), the rotation of the handle (60) drives the second rotation tube (31) to rotate. The rotation of the second rotation tube (31) also drives the roller (51) to rotate, which retracts the inner tube (14) inside the outer tube (13) gradually.

Because the second rotation tube (31) drives two rollers respectively received in the first and second seats (40,302) and the two rollers respectively control the movement of an inner tube (14) on both sides of the keyboard instrument support of the present invention, the rotation of the handle (60) ensures that the movement of the two inner tubes (14) is simultaneous and thus the heights of the two inner tubes (14) relative to the outer tubes (13) are the same. Therefore, the keyboard instrument placed on top of the two arms (12) which are pivotally mounted on top of the inner tubes (14) for easy storage is horizontal and securely supported due to the ratchet device (50), as shown in Fig. 6.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.